

RECOGNITION OF THREE TAXA OF EASTERN NORTH AMERICAN
“WALDSTEINIA” AND THEIR APPROPRIATE NAMES WHEN
INCORPORATED INTO *GEUM* (COLURIEAE: ROSACEAE)

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ABSTRACT

We review the nomenclatural and taxonomic history of eastern North American species traditionally treated in the genus *Waldsteinia* Willd. (Rosaceae), and conclude that it is desirable to recognize three taxa (as has been done with rare exceptions) and to place these in the genus *Geum* L. Given the equivocal morphological data and absence of molecular data on which to assess the relationship of the three taxa, the most conservative treatment is to place them at the same (species) rank. A new combination is made in *Geum* for the southeastern United States taxon variously treated as *W. parviflora* Small, *W. fragarioides* (Michx.) Tratt. var. *parviflora* (Small) Fernald, *W. doniana* Tratt., or *W. fragarioides* ssp. *doniana* (Tratt.) Teppner (the latter not effectively published): ***Geum donianum*** (Tratt.) Weakley & Gandhi, comb. nov.

RESUMEN

Se revisa la historia taxonómica y nomenclatural de las oriental Estados Unidos especies tratadas tradicionalmente en el género *Waldsteinia* Willd. (Rosaceae), y se concluye que es deseable reconocer tres taxa (como se ha hecho con raras excepciones) y colocarlos en el género *Geum* L. Dados los datos morfológicos equívocos y la ausencia de datos moleculares en los que apoyar la relación entre los tres taxa, el tratamiento más conservador es colocarlos en el mismo rango (especie). Se hace una nueva combinación en *Geum* para el taxon del sudeste de los Estados Unidos tratado variablemente como *W. parviflora* Small, *W. fragarioides* (Michx.) Tratt. var. *parviflora* (Small) Fernald, *W. doniana* Tratt., o *W. fragarioides* ssp. *doniana* (Tratt.) Teppner (este último no publicado efectivamente): ***Geum donianum*** (Tratt.) Weakley & Gandhi, comb. nov.

Recent investigations in the taxonomy of tribe Colurieae Rydberg of the Rosaceae have led to the conclusion that *Waldsteinia* Tratt. is phylogenetically embedded within *Geum* L. and should be combined with it (Smedmark 2006). Smedmark (2006), Smedmark et al. (2003), and Smedmark and Eriksson (2002) presented strong evidence that *Waldsteinia* is involved in ancient allopolyploidization from which parts of *Geum* have arisen, and they argue that the most reasonable circumscription of the genus is to include all the perennial herbs of Geinae involved in the reticulate evolution. Morphologically, *Waldsteinia* is comfortably congruent within a broadly defined *Geum*, differing only in the style dehiscent at its base; and *Geum* (in a narrower sense) already includes a wide diversity of style morphologies, apparently adaptations to a variety of pollination and dispersal mechanisms.

Most North American workers have accepted three taxa of *Waldsteinia* for eastern North America: Taxon A (“*fragarioides*,” sensu stricto), a northern larger-petaled entity with trifoliolate leaves; Taxon B (“*parviflora*” or “*doniana*”), a southern smaller-petaled entity with trifoliolate leaves; and Taxon C (“*lobata*”), a Southern Appalachian endemic with small petals and lobed, rather than trifoliolate, leaves (Table 1). A notable exception to the acceptance of Taxon A and Taxon B as distinct at some formal taxonomic level is the treatment of Radford et al. (1968), which lumps Taxa A and B and does not mention *W. lobata*, reported for the Carolinas by earlier authors. Smedmark (2006) made transfers into *Geum* of *Waldsteinia* species, but regarded Taxon B as a synonym of Taxon A (without explanation, but perhaps because of the nomenclatural and taxonomic confusion discussed below), leaving it without a name in *Geum*.

Although their acceptance as taxa has been nearly universal, the appropriate taxonomic level at which to recognize these entities (species, subspecies, or variety) has remained controversial and variable (Table 1).

TABLE 1. A comparison of recent taxonomic treatments of the "Waldsteinia" taxa of eastern North America.

Treatment	Taxon A: <i>fragarioides</i>	Taxon B: <i>doniana/parviflora</i>	Taxon C: <i>lobata</i>
Small (1898)	<i>Waldsteinia fragarioides</i>	<i>Waldsteinia parviflora</i>	<i>Waldsteinia lobata</i>
Rydberg (1913)	<i>Waldsteinia fragarioides</i>	<i>Waldsteinia doniana</i>	<i>Waldsteinia lobata</i>
Small (1933)	<i>Waldsteinia fragarioides</i>	<i>Waldsteinia doniana</i>	<i>Waldsteinia lobata</i>
Fernald (1950)	<i>Waldsteinia fragarioides</i> var. <i>fragarioides</i>	<i>Waldsteinia fragarioides</i> var. <i>parviflora</i>	{out of area treated}
Gleason (1952)	<i>Waldsteinia fragarioides</i>	<i>Waldsteinia parviflora</i>	{out of area treated}
Teppner (1968)	<i>Waldsteinia fragarioides</i> ssp. <i>fragarioides</i>	<i>Waldsteinia fragarioides</i> "ssp. <i>doniana</i> "	<i>Waldsteinia lobata</i>
Radford, Ahles, & Bell (1968)	Waldsteinia fragarioides		{not treated}
Gleason & Cronquist (1991)	<i>Waldsteinia fragarioides</i> var. <i>fragarioides</i>	<i>Waldsteinia fragarioides</i> var. <i>parviflora</i>	{out of area treated}
Kartesz 1999	<i>Waldsteinia fragarioides</i> ssp. <i>fragarioides</i>	<i>Waldsteinia fragarioides</i> "ssp. <i>doniana</i> "	<i>Waldsteinia lobata</i>
Smedmark (2006)	Geum fragarioides		<i>Geum lobatum</i>
Weakley & Gandhi (this paper)	<i>Geum fragarioides</i>	<i>Geum donianum</i>	<i>Geum lobatum</i>
Phipps in FNA (in prep.)	<i>Waldsteinia fragarioides</i>	<i>Waldsteinia doniana</i>	<i>Waldsteinia lobata</i>

A review of literature and specimens reveals that three taxa should be recognized in eastern North America. Habitually quite similar, the three taxa differ from one another in details of leaf lobing/division and petal size, the combination of characters strongly correlated with coherent geographic distributions. Though imperfect herbarium specimens may be difficult to interpret, there seem to be no true intermediates, nor is their clinal variation in petal size. Moreover, the "Waldsteinia group" of *Geum* is morphologically conservative, with relatively minor morphological characters separating taxa on different continents (such as the North American *G. fragarioides* and the Eurasian *G. ternatum* (Stephan) Smedmark. Indeed, the morphological relationships of the three taxa make the closer affinity of Taxon B problematic (if leaf lobing is the more phylogenetically revealing character, then Taxon B may be more closely related to Taxon A, but lacking molecular data it is plausible that the floral characters are more phylogenetically revealing, and taxa B and C are more closely related, forming a southern, small-petaled clade). For these reasons, we agree with Phipps (in prep.) that the best current (and conservative) taxonomic treatment of the "Waldsteinia group" in eastern North America is as three species.

Nomenclature has also been contentious, with disagreement as to the appropriate basionym ('doniana' or 'parviflora') to apply to Taxon B (Table 1). Fernald (1935) believed that the application of the epithet 'doniana' to the small-petaled southern taxa was a misapplication. He argued that the type plate "seems to me a garden-development in which, presumably through unwonted nutrition, the sepals become exaggeratedly large, the petals remaining fairly typical for *W. fragarioides*." Teppner (1968) convincingly argued the opposite case, that the relative size of the sepals and petals are clearly shown and described, and this primary diagnostic characteristic between the two taxa should be taken at face value. A review of the description and plate (which serves as the type) confirms Teppner's opinion, making 'doniana' the correct basionym for the southern taxon, should it be recognized taxonomically at the specific level. The plate in Sims (1813) (on which Trattinick's name is based) resembles Taxon B closely and obviously, in that it shows a plant with petals shorter than the sepals, a characteristic that is also stated in the text of both Sims (1813) and Trattinick (1823) as a distinctive or diagnostic characteristic. The stated provenance of the plant illustrated (Sims 1813) is pertinent, as well: "the plant, from which our drawing and description were taken, was brought from America, by Mr. Lyons [sic], and purchased at his sale, by Mr. Kent, of Clapton, by whom it was kindly communicated to us." Ewan & Ewan (1963) show that John Lyon listed this plant in a catalogue in 1812 (as

Dalibarda fragarioides), and also listed Mr. William Kent as having purchased plants for 14 £, 18 sh. in 1812. Presumably the plant illustrated the following year was in this lot. Though the location from which Lyon collected the plant cannot apparently be definitely known, the identification of John Lyon as the source of the plant illustrated and described is of interest, since Lyon collected extensively within the southeastern United States range of the small-petaled Taxon B. Thus, it seems very plausible that the plant described and figured as *Waldesteinia fragarioides* by Sims, and later described and named by Trattinick as the distinct *W. doniana*, is exactly what it appears to be.

Based on our review of generic circumscription, taxonomic distinctiveness, appropriate taxonomic rank, and nomenclature, we hereby effect the transfer of “Taxon B” to *Geum* at the rank of species:

Geum donianum (Tratt.) Weakley & Gandhi, comb. nov. *Waldesteinia doniana* Tratt., *Rosacearum Monographia* 3:109. 1823.

Type: Curtis's Bot. Mag. 38: pl. 1567 (LECTOTYPE, designated here).

Waldesteinia parviflora Small, Bull. Torrey Bot. Club 25:137. 1898.

Waldesteinia fragarioides var. *parviflora* (Small) Fernald, *Rhodora* 37:285. 1935.

Waldesteinia fragarioides ssp. *doniana* (Tratt.) Teppner, Zur Kenntnis der Gattung *Waldesteinia*. Diss. Univ. Graz. 1968, nom. invalid., not effectively published under provisions of the ICBN Vienna Code (McNeill 2006). Article 30.5 states that “publication on or after 1 January 1953 of an independent non-serial work stated to be a thesis submitted to a university or other institute of education for the purpose of obtaining a degree is not effectively published unless it includes an explicit statement (referring to the requirements of the Code for effective publication) or other internal evidence that it is regarded as an effective publication by its author or publisher.” Note 2 suggests forms of internal evidence as “the presence of an International Standard Book Number (ISBN) or a statement of the name of the printer, publisher, or distributor in the original printed version is regarded as internal evidence that the work was intended to be effectively published.” Although Teppner distributed approximately 50 copies of his dissertation to botanical institutions and clearly intended this to constitute effective publication (H. Teppner, pers. comm., March 2008), we reluctantly conclude that he did meet the retroactive requirements of the Vienna Code, and therefore that there is currently no valid name for this taxon at the subspecific rank.

The taxa are distinguishable by the following key.

1. Leaves trilobed (the sinuses cleft 1/8 to 3/4 of the way to the midrib); petals shorter than to about as long as the sepals; first-year leaves rather densely pubescent with stiff hairs, these distributed on the veins and on the intervein surfaces; [of a small area at the southern terminus of the Southern Appalachians in n. GA, nw. SC, and sw. NC] _____ ***G. lobatum*** (Baldw.) Smedmark
1. Leaves trifoliolate (fully divided), and also typically additionally lobed; petals shorter than to longer than the sepals; first-year leaves sparsely pubescent with stiff hairs, these distributed mostly or strictly on the veins, the intervein surfaces glabrous to very sparsely pubescent; [more widespread].
 2. Petals 2.2–4 mm long (shorter than to about as long as the sepals), 1–1.5 mm wide; terminal leaflet with a distinct petiolule 1–6 mm long, the basal angle of the leaflet acute, mostly 60–90° (avg. 75°); [distributed in the Southern Appalachians and adjacent Piedmont of AL, GA, KY, NC, SC, and TN] _____ ***G. donianum*** (Tratt.) Weakley & Gandhi
 2. Petals 4–10 mm (longer than the sepals), 2–6 mm wide; terminal leaflet sessile or with a petiolule to 3 mm long, the basal angle of the leaflet about a right angle, mostly 75–105° (avg. 90°); [widely distributed in northeastern United States and adjacent Canada, south to VA, KY, and AR] _____ ***G. fragarioides*** (Michx.) Smedmark

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